Khandesh College Education Society's

College of Engineering & Management

NH-6, Behind DIC Office, Jalgaon 425001

(An Autonomous Institute Approved by AICTE and Affiliated to DBATU, Lonere)

Course Structure and Detailed Syllabus

of

First Year Engineering for

B. Tech Programme in

Computer Science & Engineering

(Artificial Intelligence and Machine Learning)

In line with National Education Policy 2020

Effective from Academic year 2026-27

Khandesh College Education Society's

College of Engineering and Management, Jalgaon

Group A

Computer Science & Engineering (Artificial Intelligence and Machine Learning)

Semester-I

Sr. No.	Course Category	Course Code	Course Title	Exam Head	Teaching Scheme			Evaluation Scheme				Total	Credit
					L	T	P	Continuous Assessment			ESE		
								MSE	CA-1	CA-2			
1	BSC	BSC101	Engineering Mathematics- I	TH	3	1		20	10	10	60	100	4
2	ESC	ESC102	C Programming	TH	2			20	10	10	60	100	2
3	ESC	ESC102L	C Programming Lab	PR			2		30	30	40	100	1
4	BSC	BSC103	Engineering Chemistry	TH	2			20	10	10	60	100	2
5	BSC	BSC103L	Engineering Chemistry Lab	PR			2		30	30	40	100	1
6	ESC	ESC104	Environmental Science	TH	2			20	10	10	60	100	2
7	PCC	AMPCC105	Python Programming and Applications for AI & ML (AM)	TW	1					50		50	1
8	VSEC	AMVSEC105L	Python-Based Problem Solving and Applications Lab (AM)	PR			4		30	30	40	100	2
9	ESC	ESC106	Basic Electrical and Electronics Engineering	TH	3			20	10	10	60	100	3
10	ESC	ESC106L	Basic Electrical and Electronics Engineering Lab	PR			2		30	30	40	100	1
11	CCA	CCA107	Health and Wellness/ Yoga	TW			2			50		50	1
					13	1	12	100	170	270	460	1000	20

*As per the Rules and Regulations of Autonomy, it is mandatory for students to earn audit points through participation/performance in co-curricular and extra-curricular activities.

Group A

Semester-II

Computer Science & Engineering (Artificial Intelligence and Machine Learning)

Sr. No.	Course Category	Course Code	Course Title	Exam Head	Teaching Scheme			Evaluation Scheme				Total	Credit
					L	T	P	Continuous Assessment			ESE		
								MSE	CA-1	CA-2			
1	BSC	BSC201	Engineering Mathematics- II	TH	3	1		20	10	10	60	100	4
2	ESC	ESC202	Object Oriented Programming Using Java	TH	3			20	10	10	60	100	3
3	ESC	ESC202L	Object Oriented Programming Using Java Lab	PR			2		30	30	40	100	1
4	BSC	BSC203	Engineering Physics	TH	2			20	10	10	60	100	2
5	BSC	BSC203L	Engineering Physics Lab	PR			2		30	30	40	100	1
6	PCC	AMPCC204	Introduction to AI and Generative AI (AM)	TW	1					50		50	1
7	VSEC	AMVSEC204L	AI Tools and Applications Lab (AM)	PR			4		30	30	40	100	2
8	ESC	ESC205	Engineering Graphics	TW	1					50		50	1
9	ESC	ESC205L	Engineering Graphics Lab	OR			2		30	30	40	100	1
10	AEC	AEC206	Personality Development and Communication Skill	TH	2			20	10	10	60	100	2
11	AEC	AEC206L	Personality Development and Communication Skill Lab	TW			2			50		50	1
12	VSEC	VSEC207	Workshop Practices	TW			2			50		50	1
13	IKS	IKS208	#IKS Bucket	TW	2					50		50	2
					14	1	14	80	160	410	400	1050	22

Sr. No.	Abbreviation of	Stands For
1	BSC	Basic Science Course,
2	ESC	Engineering Science Course,
3	PCC	Programming Core Course
4	PEC	Programming Elective Course
5	Multidisciplinary (OE)	Open Elective Other than particular program
6	VSEC	Vocational and Skill Enhancement Course
7	HSSM	Humanities Social Science and Management
8	IKS	Indian Knowledge System
9	HSSM	VEC: Value Education Course
10	CCA	Co- curricular & Extracurricular Activities
11	L	Lecture Hours
12	T	Tutorials Hours
13	P	Practical Hours
14	MSE	Mid Semester Examination
15	CA1	Continuous Assessment Marks of Assignments
16	CA2	Continuous Assessment Marks of Class Test
17	ESE	End Semester Examination
18	TW	Term work Assessment
19	TH	Theory Examination
20	OR	Oral Examination
21	PR	Practical Examination

First Year (Semester - I)

Engineering Mathematics -I

Course Code	Teaching Scheme	Examination Scheme	Credit	Course Category
BSC101	Lecture: 3 hrs./week Tutorial : 1hr./week	Continuous Assessment: 20 Marks Mid Semester Exam:20 Marks End Semester Exam: 60 Marks (Duration 03 hrs.)	4	BSC

Course Objectives:

1) To understand and apply linear algebra techniques, including matrix inversion, rank, eigen values/eigenvectors, and Cayley –Hamilton theorem, for solving systems of linear equations in engineering contexts.
2) To learn partial differentiation methods and their use in analyzing multivariable functions—including total derivatives, Euler's theorem for homogeneous functions, and changing variables.
3) To apply partial differentiation techniques, including use of Jacobians, Taylor and Maclaurin expansions, finding maxima/minima, and solving with Lagrange multipliers for optimizing engineering problems.
4) To develop skills in reduction formulas and curve tracing, enabling graphical analysis and integrative reduction in mathematical modeling.
5) To handle multiple integrals—double and triple integrals in Cartesian and polar form—and apply them to compute areas, volumes, surface areas, centroids, and moments of inertia in engineering problems.

Course Outcomes:

CO 1. Equip students with the fundamental knowledge to apply matrix techniques (linear equations) for solving various engineering problems.

CO 2. Analyze how changes with respect to one variable while holding the other constant function of multiple variables.

CO 3. Compute Jacobian of function of several variables and maxima/minima, series of expansion of multi valued functions.

CO 4. Identify and sketch of curves in various coordinate system.

CO 5. Compute multiple integrals and their applications to find area and volume.

Course Content:

Unit 1: Matrices **[9 Hours]**

Inverse of a matrix by Gauss-Jordan method; Rank of a matrix; Normal form of a matrix; Consistency of non- homogeneous and homogeneous system of linear equations; Eigen values and Eigen vectors; Properties of Eigen values and Eigen vectors (without proofs); Cayley-Hamilton's theorem (without proof) and its applications.

Unit 2: Partial Differentiation **[9 Hours]**

Partial derivatives of first and higher orders; Homogeneous functions–Euler's Theorem for functions containing two and three variables (with proofs); Total derivatives; Change of variables.

Unit 3: Applications of Partial Differentiation **[8 Hours]**

Jacobians - properties; Taylor's and McLaurin's theorems (without proofs) for functions of two variables; Maxima and minima of functions of two variables; Lagrange's method of undetermined multipliers.

Unit 4: Tracing of Curve and Reduction Formulae **[8 Hours]**

Reduction formulae for $\int_0^{\frac{\pi}{2}} sin^n x\, dx$, $\int_0^{\frac{\pi}{2}} Cos^n x\, dx$, $\int_0^{\frac{\pi}{2}} sin^m x\, Cos^n x\, dx$;Tracing of the curves given in Cartesian, parametric & polar forms.

Unit 5: Double and Triple Integration **[8 Hours]**

Double integration in Cartesian and polar co-ordinates; Evaluation of double integrals by changing the order of integration and changing to polar form; Triple integral; Applications of multiple integrals to find area as double integral, volume as triple integral and surface area.

Basics of MATLAB or SCILAB **[16 Hours]**

Overview of MATLAB or Scilab, Basic Syntax, Introducing Variables, Relational and Logical, Operators Vectors Matrix. Practice examples on Unit 1 to Unit 5 on MATLAB or Scilab.

Text Books

1) Higher Engineering Mathematics by B. S. Grewal, Khanna Publishers, New Delhi.
2) Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley &Sons, New York.
3) A Course in Engineering Mathematics (Vol I) by Dr. B. B. Singh, Synergy Knowledge ware, Mumbai.
4) A Text Book of Applied Mathematics (Vol I & II) by P. N. Wartikar and J. N. Wartikar, Pune Vidyarthi Griha Prakashan, Pune.
5) Higher Engineering Mathematics by H. K. Das and Er. Rajnish Verma, S. Chand & CO. Pvt. Ltd., New Delhi.

Reference Books

1) Higher Engineering Mathematics by B. V. Ramana, Tata McGraw-Hill Publications, New Delhi.
2) A Text Book of Engineering Mathematics by Peter O' Neil, Thomson Asia Pvt. Ltd., Singapore.
3) Advanced Engineering Mathematics by C. R. Wylie & L. C. Barrett, Tata Mcgraw – Hill Publishing Company Ltd., New Delhi.
4) Master in MATLAB 7 (Edition 8) by Duane Hanselman, Bruce Littlefield, Pearson Prentice Hall, 2005.

First Year (Semester - I)

C Programming

Course Code	Teaching Scheme	Examination Scheme	Credit	Course Category
ESC102	Lecture: 2 hrs./week	Continuous Assessment: 20 Marks Mid Semester Exam: 20 Marks End Semester Exam: 60 Marks (Duration 03 hrs.)	2	ESC

Course Objectives:

1. To develop logical skills and programming skills to solve basic and advanced computing problems.
2. To learn the c-programming language concepts for problem solving.

Course Outcomes:

After completion of this course, students will be able to:

CO1. Gain a broad perspective about the uses of computers in engineering industry and C Programming.

CO2. Understand the use of Types, operators and expressions in programming.

CO3. Apply the knowledge of flow statements and functions for control based computational algorithms.

CO4. Understand the concepts of arrays ad pointers in C.

CO5. Apply the knowledge of structure in OS file management

Course Contents:

UNIT- 1: Fundamental of the Computer and Computing Concepts [6 Hours]

Generation of computers, Classification of computers, Basic Anatomy of Computer System, Input Devices, Processor, Output Devices, Memory Management, Types of Computer Software, Overview of Operating system, Concept of Networking. Process of programming: Editing, Compiling, Error Checking, executing, testing and debugging of programs. IDE commands. Eclipse for C Program development, basic of Flowcharts and Algorithms.

UNIT- 2: Types, Operators and Expressions [6 Hours]

C Tokens, Data types, sizes, initialization and declarations, arithmetic operators, relational and logical operators, increment and decrement operators, bitwise operators, assignment operators and expressions, conditional expressions precedence and order of evaluation, type conversions.

UNIT- 3: Control Flow [6 Hours]

Statements and Blocks: If-else, if-else ladder, nested if-else, switch-case, Loops: while, for, do-while, break, continue, go to and Labels. Functions and Program Structure: Basic of functions, In build functions, user defined functions, function returning various data types, external variables scope rules.

UNIT- 4: Arrays and Pointers in C **[6 Hours]**

Initializing arrays, initializing character arrays, multidimensional arrays. Pointer: Definition and uses of pointers, Pointers to integers, characters, floats, arrays.

UNIT- 5: Structures in C and File Management: **[6 Hours]**

Basics of structures, structures and functions arrays of structures, Pointers in structures. Introduction to File Management: Defining and Opening File, Closing File, Input/output Operations on File.

Text Books

1) R. S. Bichkar, Programming with C, Orient Blackswan, 1st Edition, 2012.
2) Herbert Schildit, C the Complete Reference, McGraw-Hill Publication, 2000.
3) Balguru wamy, Programming in C, PHI.
4) Yashwant Kanitkar, Let Us C, PHI.

Reference Books

1) Brian W. Kernighan and Dennis M. Ritchie, the C Programming Language, Prentice Hall of India.
2) R. G. Dromey, ―How to solve it by Computer‖, 1st Edition, Pearson Education, 2006.
3) Rajaraman V, the Fundamentals of Computer, 6th Edition, Prentice-Hall of India, 2014.
4) Steve Oualline, Practical C Programming, 3 Edition, O'Reilly Press, 2006.
5) Jeri R. Hanly, Elliot B. Koffman, Problem Solving and Program Design in C, 7th Edition, Pearson Education, 2012.
6) Balagurusamy E, Programming in ANSI C, 8th Edition, Tata McGraw-Hill, 2019.
7) Gottfried, Programming with C, 3 Edition, Tata McGraw-Hill, 2018.

First Year (Semester - I)

C-Programming Lab

Course Code	Teaching Scheme	Examination Scheme	Credit	Course Category
ESC102L	Practical- 2 hrs./week	Continuous Assessment: 60 Marks End Semester Exam: 40 Marks	2	ESC

Course Objectives:

1. To understand the basic structure of C programs, data types, variables, and operators.
2. To develop problem-solving skills using conditional statements, loops, and functions in C programming.
3. To learn the implementation of arrays, pointers, structures, and recursion for efficient programming solutions.
4. To understand file handling concepts and perform data processing operations using C programs.
5. To develop logical thinking and programming ability for solving real-world computational problems.

Course Outcomes:

After successful completion of this course, students will be able to:

CO1. Write and execute C programs using variables, data types, operators, and expressions.

CO2. Apply decision-making and looping statements to solve programming problems effectively.

CO3. Develop modular programs using functions, recursion, arrays, and pointers.

CO4. Implement structures and arrays of structures for managing and processing data records.

CO5. Perform file handling operations such as reading, writing, copying, and processing data files in C.

LIST OF PRACTICALS

Minimum 10 Practical's are to be performed based on contents from syllabus Sample List:

Practical No.	Title
1	Write a C program to declare and initialize variables of different data types and display their sizes.
2	Implement arithmetic, relational, and logical operations in C programs and display the results.
3	Write a program to demonstrate the use of conditional expressions and explain the order of evaluation.
4	Create a C program to perform bit wise operations on integer variables and print the results.
5	Develop a C program to demonstrate the use of assignment operators and evaluate expressions involving them.

6	Write a C program to implement various control flow statements such as if-else, switch- case, and loops, to solve a given problem.
7	Create a function in C to calculate the factorial of a given number and display the result.
8	Write a program to find the sum of digits of a number using recursion.
9	Implement a menu-driven programming C using switch-case statements to perform arithmetic operations.
10	Develop a C program to print the Fibonacci series using a loop.
11	Write a C program to initialize and display elements of a one-dimensional array.
12	Implement a program to find the largest and smallest elements in an array
13	Create a C program to transpose a matrix using a two-dimensional array.
14	Write a program to demonstrate the use of pointers to access elements of an array.
15	Develop a C program to swap two numbers using pointers.
16	Define a structure to represent a student record with attributes like name, roll number, and marks, and write a program to display the student details.
17	Create an array of structures to store details of multiple students and perform operations like searching and sorting based on roll number.
18	Write a program to read data from a text file, perform some operations (e.g., calculation), and write the results to another file.
19	Implement file handling operations in C to copy the contents of one file to another.

First Year (Semester -I)

Engineering Chemistry

Course Code	Teaching Scheme	Examination Scheme	Credit	Course Category
BSC103	Lecture: 2 hrs./week	Continuous Assessment: 20 Marks Mid Semester Exam: 20 Marks End Semester Exam: 60 Marks (Duration 03 hrs.)	2	BSC

Course Objectives:

1) To understanding water quality parameters, treatment processes, and relevant regulations.
2) To providing students with a comprehensive understanding of the properties, behavior, and applications of various engineering materials
3) To identifying metals & corrosion types, understanding their causes, and applying appropriate control method.
4) To understanding the properties and applications of fuels and lubricants, particularly in the context of engines and machinery.
5) To understanding of this field, enabling them to analyze and apply electrochemical principles to various applications.

Course Outcomes:

CO1. Evaluate water quality, select appropriate treatment technologies, and understand operational and maintenance procedure.

CO2. Select appropriate materials for specific engineering applications based on their properties and performance requirements.

CO3. Assess corrosion risks, select suitable materials, and implement effective corrosion management strategies

CO4. Ability to classify fuels and lubricants, understand their properties, and evaluate their performance in engines

CO5. Apply their understanding of electrochemistry to various applications, such as batteries, fuel cells.

Course Content-

Unit 1: Water Treatment [6 Hours]

Introduction, Hard and Soft water, Disadvantages of hard water –In Domestic use, In Industrial use, softening of water – Zeolite process, Ion exchange process, Hot Lime –Soda process, water characteristics- Hardness and its determination by EDTA method, Dissolved oxygen (DO) and its determination by Winkler's method.

Unit 2: Engineering Materials [6 Hours]

Cement: Introduction, Portland cement, Chemical Composition of Cement Gypsum: Plaster of Paris, Properties and Uses High polymers: Introduction. Types of Polymerization, Thermoplastic and Thermosetting resin, Constituent of Plastic, Synthesis of Urea formaldehyde and its Properties and Uses, Brief discussion on Natural Rubber, Synthesis of Styrene - butadiene rubber and its Properties and uses.

Unit 3: Metals and Corrosion [5 Hours]

Introduction, Occurrence of metals in free & combined state, Physical & chemical properties of metals, Fundamental reason of corrosion, Electrochemical Corrosion (Wet corrosion), Direct Chemical Corrosion (Dry corrosion), Factors affecting the rate of corrosion, Types of corrosion, Methods to minimize the rate of corrosion- Proper designing, Cathodic and Anodic protection method.

Unit 4: Fuels and Lubricants [7 Hours]

Fuels: Introduction, Classification of fuel, Calorific value of a fuel, Characteristics of a good fuel, solid fuel- Coal and Various types of Coal, Analysis of coal- Proximate and Ultimate analysis, Liquid fuel- Refining of Petroleum. Lubricants: Introduction, classification of lubricants - Solid, Semi –solid and Liquid Lubricants, Properties of lubricants: Physical properties – Viscosity, Viscosity index, surface tension, Flash point and Fire point. Chemical properties – Acidity, Saponification.

Unit 5: Electrochemistry [6 Hours]

Introduction – Definition and units of Ohm's Law, Specific Resistance, Specific Conductance, Equivalent and Molecular Conductance, Cell constant, Conductometric titrations, Nernst equation and its application for the calculation of half-cell potential, Glass electrode, Fuel cell (H_2O_2), Advantages of fuel cell, Ostwald's theory of acid- base indicator.

Text Books:

1) Jain P.C & Jain Monica, Engineering Chemistry, Dhanpat Rai& Sons, Delhi, 1992.
2) Bhal &Tuli, Text book of Physical Chemistry, S. Chand & Company, New Delhi.
3) Shikha Agarwal, Engineering Chemistry- Fundamentals and applications, Cambridge Publishers - 2015.
4) Gurudeep Chatwal and Sham Anand, Instrumental methods of Chemical Analysis, Himalaya Publishing House, New Delhi,2013
5) V. R. Gowarikar , Polymer Science, New Age International Publication,2015

Reference Books:

1) Barrow G.M., Physical Chemistry, McGraw-Hill Publication, New Delhi,2013
2) O. G. Palanna, Engineering Chemistry, Tata McGraw-Hill Publication, New Delhi.,2015
3) WILEY, Engineering Chemistry, Wiley India, New Delhi 2014.
4) S. S. Dara, Engineering Chemistry, McGraw Hill Publication, New Delhi.,2013
5) Willard, Hobart H.; Merritt, Lynne L., Jr.; Dean, John A. Instrumental Methods of Analysis, American Chemical Society,2013

First Year (Semester -I)

Engineering Chemistry Lab

Course Code	Teaching Scheme	Examination Scheme	Credit	Course Category
BSC103L	Practical-2 hrs. /week	Continuous Assessment: 60 Marks End Semester Exam: 40 Marks	1	BSC

Course Outcomes:

Students will be able to:

CO1. Analyze water quality by determining key parameters such as hardness, alkalinity, pH, and chloride content using standard titrimetric and instrumental methods.

CO2. Determine the properties of fuels and lubricants and assess their suitability for industrial and engineering applications.

CO3. Demonstrate effective use of laboratory techniques, instruments, and safety procedures while working in a chemistry lab.

LIST OF PRACTICALS

Minimum 10 practical's are to be performed based on contents from syllabus Sample List of Practical's:

Practical No.	Title
1	Determination of Hardness of water sample by EDTA method.
2	Determination of Chloride content in water sample by precipitation titration method.
3	Determination of Dissolve Oxygen in water by Iodometric method.
4	To determine Alkalinity water sample.
5	Determination of concentration of strong Acid by titrating it conductometrically by strong base.
6	Determination of Percent purity of Bleaching Powder.
7	To determine Calorific value of a fuel.
8	Determination of Acid value of an oil sample.
9	Determination of Saponification value of an oil sample.
10	To determine Surface tension of the given liquid at room temperature by Stalagmometer.
11	To determine the coefficient of Viscosity of a given liquid using Ostwald's Viscometer
12	To determine the strength of given HCL using a Standard solution of NaOH by pH-metric Titration (Acid Base titration).

Reference Books:

1. Systematic experiments in Chemistry, A. Sethi, New Age International Publication, New Delhi.
2. Practical Inorganic Chemistry, A. I. Vogel, ELBS Pub.
3. Practical in Engineering Chemistry, S. S. Dara

First Year (Semester - I)

Environmental Science

Course Code	Teaching Scheme	Examination Scheme	Credit	Course Category
ESC104	Lecture: 2 hrs./week	Continuous Assessment: 20 Marks Mid Semester Exam: 20 Marks End Semester Exam: 60 Marks (Duration 03 hrs.)	2	ESC

Course Objectives:

1) To impart the knowledge of Environmental education to the students of Engineering and Technology.
2) To explain basic concepts of sources, causes, effects and control measures of environmental pollution
3) To impart the knowledge of energy sources and power generation
4) To understand the role of individual for the protection of Environment.

Course Outcomes:

Student should able to:

CO1. Know and understand about components and segments of environment, ecosystem and its types.

CO2. Understand power consuming and power developing devices for the effective utilization.

CO3. Understand and to explain types of Energies such as wind energy, solar energy, hydro energy etc.

CO4. Understand and explain various types of air pollution, their effects and control measures.

CO5. Know the various types of water pollution, sources, waste water treatment, effect of water pollution on health and soil pollution.

Course Contents:

Unit 1: Environment **[5 Hour]**

Introduction, Ecosystem: Types of Ecosystem, Components of Ecosystem Components of Environment, Types of Environment, Brief discussion on Segments of Environment, Environmental Pollution.

Unit 2: Energy and Sources **[6 Hour]**

Introduction, Sources of Energy, Renewable sources of Energy: Solar Energy, nuclear energy, Hydro Energy, Tidal Energy, Wind Energy, Biomass Energy, Geothermal Energy, Non Renewable Energy Sources Coal, Petroleum, Natural Gas.

Unit 3: Air Pollution **[6 Hour]**

Introduction, Brief discussion on air pollutants, Sources of Air Pollution: Pollutants from Industry, Pollution by Automobiles, Effect of Air Pollutions: Acid rain, Green House Effect, Global warming; Brief discussion on Control of Air Pollution.

Unit 4: Water and Soil Pollution **[7 Hour]**

Introduction, Types of Water Pollutants, Sources of Water Pollution, Methods to remove impurities in water, Treatment of Industrial waste water: Activated Sludge Process, Impact of Water Pollution on Human Health, Water as a carrier for the transmission of diseases. Sources of Soil Pollution, Harmful effects of Soil Pollution, Control of Soil Pollution.

Unit 5: Climate Change Science **[6 Hour]**

Introduction, Components of climate system and their interaction (atmosphere, ocean, cryosphere, landmass and biomass, Atmospheric circulation and energy balance, Global warming and climate change, Ozone layer depletion, environmental policy & agreements

Text Books

1) A Text book on Power System Engineering, A, Chakrabarti, M. L. Soni, P. V. Gupta, U. S. Bhatnagar, Dhanpat Rai and Co. Pvt. Ltd.-2013
2) Environmental Chemistry (II edition), Ane Books Pvt. Ltd. V. K. Ahluwalia-2012
3) Environmental Chemistry (sixth edition), A. K. De-2012
4) Essential Environmental Studies, S. P. Mishraand, S. N. Pandey-2016

Reference Books

1) Environmental Science, sixteenth edition, G. Tyler Miller and S. E. Spoolman, Cengage publication.-2013
2) A Textbook of Engineering Chemistry, Dr. S. S. Daraand Dr. S. S. Umare-2013
3) Textbook on Experiments & Calculations in Engineering Chemistry: S. S. Dara, S. Chand & Company Pvt. Ltd.

FIRST YEAR (SEMESTER- I)

Python Programming and Applications for AI & ML

Course Code	Teaching Scheme	Examination Scheme	Credit	Course Category
AMPCC105	Python Programming and Applications for AI & ML	Term work: 50 Marks	1	PCC

Course Objectives:

1) To introduce Python programming fundamentals for Artificial Intelligence and Machine Learning.
2) To develop understanding of Python syntax, data types, operators and control structures.
3) To enable students to design modular programs using OOP and exception handling.
4) To familiarize learners with Python libraries, data handling and visualization techniques used in AI & ML applications.

Course Outcomes:

By the end of this course, students will be able to:

CO1. Understand Python syntax and programming constructs.

CO2. Develop Python programs using functions and data structures.

CO3. Design modular programs using OOPs and exception handling mechanisms.

CO4. Apply Python libraries for numerical and data analysis tasks.

CO5. Perform basic data visualization using Python tools.

Course Content:

Unit-1: Introduction to Python Programming [3 Hours]

Introduction to Python; Features and Applications of Python; Installation and Python Environment; Python IDEs; Variables and Data Types; Input and Output Operations; Operators and Expressions; Comments and Indentation.

Unit-2: Control Structures and Functions [3 Hours]

Decision Making Statements (if, if-else, nested if); Looping Statements (for, while); Break and Continue Statements; Functions; Function Arguments; Return Statement; Scope of Variables.

Unit-3: Python Data Structures [3 Hours]

Strings and String Operations; Lists and List Methods; Tuples; Dictionaries; Sets; Basic Operations on Data Structures; Applications in AI and Data Handling.

Unit-4: OOP and Exception Handling [3 Hours]

Introduction to OOP; Need of OOP; Object, Class, Data abstraction, data encapsulation, polymorphism and inheritance; Exception Handling meaning and uses; Exception handling using Try, except, else and finally; User-defined Exception

Unit-5: Python for AI & ML Applications [3 Hours]

Introduction to NumPy; Arrays and Mathematical Operations; Introduction to Pandas Data Frame; Data Loading and Exploration; Introduction to Matplotlib; Basic Data Visualization; AI & ML Application Examples using Python.

Text Books:

1) Paul Deitel and Harvey Deitel, “Python for Programmers”, Pearson
2) Reema Thareja, “Python Programming Using Problem Solving Approach”, Oxford University Press.
3) Eric Matthes, “Python Crash Course”, No Starch Press.

Reference Books:

1) Allen B. Downey, “Think Python”, O’Reilly Publications.
2) Wes McKinney, “Python for Data Analysis”, O’Reilly Publications.
3) Jake VanderPlas, “Python Data Science Handbook”, O’Reilly Publications.

FIRST YEAR (SEMESTER – I)

Python-Based Problem Solving and Applications Lab

Course Code	Teaching Scheme	Examination Scheme	Credit	Course Category
AMVSEC105L	Python-Based Problem Solving and Applications Lab	Continuous Assessment: 60 Marks End Semester Exam: 40 Marks	2	VSEC

Course Objectives:

1) To introduce students to Python programming fundamentals.
2) To develop logical and problem-solving skills using Python.
3) To familiarize learners with Python data structures and functions
4) To provide basic exposure to Python libraries used in AI & ML.
5) To prepare students for advanced AI, Machine Learning and Data Science courses.

Course Outcomes:

By the end of the practical course, students will be able to:

CO1: Write simple Python programs using basic syntax and operators.

CO2: Implement decision-making and looping constructs.

CO3: Use Python data structures for problem solving.

CO4: Apply Python libraries for numerical computation and data handling.

CO5: Develop simple AI & ML-oriented Python applications.

LIST OF PRACTICALS (Python Programming Fundamentals)

(Perform Any Eight Practical from this Group)

Practical No.	Practical Title
1	Installation and setup of Python IDE (IDLE, VS Code or Google Colab).
2	Write Python programs using variables, data types and input-output statements.
3	Perform arithmetic, relational and logical operations using Python operators.
4	Develop programs using conditional statements (if, if-else, nested if).
5	Develop programs using looping statements (for loop and while loop).

Practical No.	Practical Title
6	Write programs to generate multiplication tables and simple patterns.
7	Implement Python functions with arguments and return values.
8	Perform string operations and string manipulation programs.
9	Write programs using lists and list operations.
10	Write programs using tuples, dictionaries and sets.
11	Develop menu-driven programs using basic Python concepts.
12	Create simple mini applications such as calculator, student grade system, etc.

Python for AI & ML Foundation (Perform All Practical from this Group)

Practical No.	Practical Title
13	Introduction to NumPy and creation of arrays.
14	Perform basic mathematical operations using NumPy.
15	Introduction to Pandas Data Frame and dataset loading.
16	Perform basic data exploration using Pandas.
17	Create simple charts using Matplotlib.
18	Read and analyze CSV files using Python.
19	Develop a simple AI/ML application using sample datasets.
20	Perform basic Data Pre-processing tasks

Suggested Textbooks:

1. Reema Thareja, “Python Programming Using Problem Solving Approach”, Oxford University Press
2. Paul Deitel and Harvey Deitel, “Python for Programmers”, Pearson.
3. Eric Matthes, “Python Crash Course”, No Starch Press
4. Al Sweigart, “Automate the Boring Stuff with Python”, No Starch Press.
5. Wes McKinney, “Python for Data Analysis”, O’Reilly Publications.

Reference Books:

1. Allen B. Downey, “Think Python”, O’Reilly Publications.
2. Jake VanderPlas, “Python Data Science Handbook”, O’Reilly Publications.
3. Mark Lutz, “Learning Python”, O’Reilly Publications.

First Year (Semester - I)

Basic Electrical and Electronics Engineering

Course Code	Teaching Scheme	Examination Scheme	Credit	Course Category
ESC106	Lecture: 3 hrs./week	Continuous Assessment: 20 Marks Mid Semester Exam: 20 Marks End Semester Exam: 60 Marks (Duration 03 hrs.)	3	ESC

Course Objectives:

1) To understand the fundamentals of DC and AC electrical circuits, including circuit laws, sources, and power calculations.
2) To study the principles of magnetic circuits, electromagnetic induction, and the construction and working of basic electrical machines like DC motors, BLDC motors, and transformers.
3) To explain the properties of semiconductors, working of diodes and the use of rectifiers, filters, and regulated power supplies.
4) To analyze the structure, operation, and applications of BJTs, FETs, and MOSFETs in various configurations, including amplifier and switching circuits.

Course Outcome:

CO1: Apply basic laws and analysis techniques to electrical DC and AC circuits.

CO2: Understand the principles of magnetic circuits and electrical machines.

CO3: Demonstrate understanding of semiconductor materials and diodes.

CO4: Understand and analyze the characteristics and applications of Bipolar Junction Transistors (BJT).

CO5: Understand and compare the operation of different types of FETs and MOSFETs.

Course Contents:

Unit 1: Electrical Circuits **[8 Hours]**

DC Circuits: Circuit Components: Resistor, Inductor, Capacitor, Ohm's Law, Kirchhoff's Laws voltage and current sources -Independent and Dependent Sources, Nodal and Mesh analysis. (DC only) AC Circuits: Frequency, Average value, R.M.S. value, Form factor, Peak factor, Instantaneous power, real power, reactive power and apparent power, power factor.

Unit 2: Magnetic Circuits **[9 Hours]**

Permanent magnets and Electromagnets, Faraday's Laws of Electromagnetic Induction, Dynamically induced EMF, Static induction, Self-induced and Mutually induced EMF, Torque produced on a current carrying coil in a magnetic field, Lenz Law, Fleming Rules. Motors: DC motor construction & working, EMF equation, Construction & Working of Brushless DC(BLDC) motor. Construction & Working of Transformer (Single Phase).

Unit 3: Semiconductors and Diodes **[8 Hours]**

Intrinsic and Extrinsic semiconductor, Construction, Symbol, working principle of: P-N junction diode & Zener diode, Forward and reverse biasing and V-I characteristics of P-N junction diode & Zener diode, Types of Rectifiers- Circuit operation, Input- output waveforms. Filters, Regulated power supply.

Unit 4: Bipolar Junction Transistor **[8 Hours]**

PNP, NPN Transistor Construction & Working. Transistor configurations: CB, CE, CC, Transistor characteristics (input, and output), DC load Line, Operating point, Types of biasing, Voltage divider bias. Transistor as switch, Transistor as amplifier.

Unit 5: Field Effect Transistor & MOSFET **[9 Hours]**

Construction &Working of JFET (N channel and P- channel), Characteristics (Drain and Transfer characteristics), Construction & working of Enhancement and Depletion MOSFET, Construction and working of NMOS, PMOS, CMOS.

Suggested Text/Reference Book

1) Electrical Circuit Analysis & Magnetic Circuits Introductory Circuit Analysis, Robert L. Boylestad & Louis Nashelsky, Prentice Hall, 2016 (13th ed.).
2) V. N. Mittal and Arvind Mittal, Basic Electrical Engineering, McGraw-Hill Publication.
3) Vincent DelToro, Electrical engineering Fundamentals, PHI Publication, 2nd Edition, 2011.
4) Semiconductors, Diodes, Transistors, Rectifiers, Amplifiers, A Textbook of Electronic Devices & Circuits, J. B. Gupta, S.K. Kataria & Sons, 2010
5) Semiconductor Devices & Theory (Open-educational resource), Semiconductor Devices: Theory and Application, James M. Fiore, dissidents, 2018
6) General Electronics Reference (Analog/Digital, Transistors, Circuit Design), The Art of Electronics, Paul Horowitz & Winfield Hill, Cambridge University Press, 2015 (3rd ed.)
7) Solid-State Devices (FETs, BJTs, Semiconductor Physics), Solid-State Electronic Devices, Ben G. Streetman, Prentice Hall India, 2006 (6th ed.)

First Year (Semester - I)

Basic Electrical and Electronics Engineering Lab

Course Code	Teaching Scheme	Examination Scheme	Credit	Course Category
ESC106L	Practical- 2 hrs./week	Continuous Assessment: 60 Marks End Semester Exam: 40 Marks	1	ESC

LIST OF PRACTICALS

Minimum 10 practical's are to be performed based on contents from syllabus Sample List of Practical's:

Practical No.	Title
1	Study of front panel of CRO and function generator.
2	Verification of Kirchhoff's Voltage and Current Laws in a DC circuit.
3	Measurement of RMS, Average, Form factor, and Peak factor using a sinusoidal waveform
4	Construction and Working Demonstration of DC Motor – identification of parts, winding, etc.
5	Demonstration of Brushless DC Motor Functionality.
6	Verify the transformation turn ratio.
7	V-I Characteristics of Zener Diode (Forward and Reverse Bias).
8	Observation of input/output waveforms of Half-Wave, Bridge Rectifier Circuits
9	Identification and Testing of NPN and PNP Transistors.
10	Input and Output Characteristics of a Transistor in CE Configuration.
11	Transistor as an Amplifier – small signal amplifier setup with output waveform.
12	Drain and Transfer Characteristics of JFET (N-channel/P-channel).

First Year (Semester - I)

Health and Wellness/Yoga

Course Code	Teaching Scheme	Examination Scheme	Credit	Course Category
CCA107	Practical- 2 hrs./week	Continuous Assessment : 50 Marks	1	CCA

Health and Wellness

Course Objectives:

1) To address issues related to health, adjustment, and well-being.
2) To apply psychological insights for a more satisfying and meaningful life.

Course Outcomes:

By the end of the course, students will be able to:

CO1. Handle mental distress and psychological disorders.

CO2. Understand and improve mental health and well-being.

CO3. Explore theories and research on happiness to understand both positive and negative aspects of human behavior.

Course Contents:

Unit 1: Psychology of Happiness

- Definition and sources of happiness
- Role of socio-economic factors
- Importance of positive emotions

Unit 2: Can We Become Happier?

- Genetic set-point and hedonic adaptation
- Sustainable happiness model
- Role of intentional activities

Unit 3: Happiness Activities I

- Practicing gratitude and positive thinking
- Love, kindness, and avoiding negative comparisons

Unit 4: Happiness Activities II

- Identifying and using personal strengths
- Experiencing “flow” for sustained happiness

Unit 5: Is Happiness Sufficient?

- Concept of eudemonic well-being
- Theories of self-determination and motivation.

Reference:

1) W. Weiten, and M. A. Lloyd, Psychology Applied to Modern Life: Adjustment in the 21st Century, Wadsworth Publishing, 2007

2) R. Harington, Stress, Health and well-being: Thriving in the 21st century, Wadsworth Publishing, 2013.

3) I. Boniwell, Positive psychology in anutshell, McGraw-Hill Education, 2012.

4) S. Lyubomirsky, The how of happiness, Penguine Press, 2008.

Yoga Education

Course Objectives:

- Learn the core teachings of the Vedas and Upanishads
- Understand the Four Streams of Yoga
- Study the Six systems (Shaddarshanas) of Indian Philosophy
- Gain insight into the lives and messages of spiritual masters and explore Indian culture
- Learn the basics of Anatomy, Physiology**,** and their connection to Yoga and Health

Course Outcomes:

After completing this course, students will be able to:

CO1. Understand the essential messages of the Vedas and Upanishads

CO2. Learn the principles of Bhakti, Raja, Karma, and Jnana Yoga

CO3. Gain knowledge of the Six classical schools of Indian philosophy

CO4. Appreciate the contributions of Indian spiritual masters and culture

CO5. Understand human physiology in relation to yoga and health

Course Contents:

Unit I – Message of Vedas and Upanishads

- Themes: Search for happiness and ultimate reality

Unit II – Streams of Yoga

- **Bhakti Yoga** (devotion)
- **Raja Yoga** (meditation)
- **Antaranga & Bahiranga Yoga** (inner & outer disciplines)
- **Karma Yoga** (selfless action)
- **Jnana Yoga** (knowledge and wisdom)

Unit III – Shaddarshanas (Six Systems of Indian Philosophy)

- Nyaya, Vaisheshika, Sankhya, Yoga, Purva Mimamsa, Uttara Mimamsa

Unit IV – Life and Teachings of Spiritual Masters

Focus on:

- Sri Ramakrishna Paramahamsa
- Maa Sharada Devi
- Swami Vivekananda

- Their influence on Indian culture

Unit V – Anatomy, Physiology, and Yoga

- Yoga and Exercise Physiology
- Concept of health through **Pancha Kosha Vivek** (five sheaths)
- Yogic understanding of health and disease

Text Books:

1) Rajayoga-Swami Vivekananda-Rama Krishna Ashrama Publications.
2) Hathayoga Pradipika of Swatmarama -Kaivalya dhama, Lonavala
3) The Science of Yoga-Taimini-Theosophical Publishing House, Adyar, Madras.
4) Yoga sutras of Patanjali - Hariharananda Aranya, University of Calcutta Press, Calcutta.

Reference Books:

1) Patanjal Yoga Pradeepa Omananda Tirtha- Geeta Press, Gorakhpur.
2) Gherandasamhita- Bihar School of Yoga, Munger, Bihar.
3) Shivayogadipika - Sadashiva brahmendra, Ananda Ashrama granthavali, Choukhamba Press.
4) Yoga Darshan: Swami Niranjanananda-Sri Panchadashanam Paramahamsa Alakh Bara, Deoghar.
5) Four chapters on Freedom (commentary on the Yoga sutras of Patanjali), Swami Satyananda (1983), Bihar School of Yoga, Munger.

First Year (Semester - II)

Engineering Mathematics -II

Course Code	Teaching Scheme	Examination Scheme	Credit	Course Category
BSC201	Lecture: 3 hrs./week Tutorial : 1 hr./week	Continuous Assessment: 20 Marks Mid Semester Exam: 20 Marks End Semester Exam: 60 Marks (Duration 03 hrs.)	4	BSC

Course Objectives:

1. To know and discuss the need and use of complex variables to find roots, to separate complex quantities, and to establish a relation between circular and hyperbolic functions.
2. To understand and solve first and higher-order differential equations and apply them as a mathematical modeling in electric and mechanical systems.
3. To determine Fourier series representation of periodic functions over different intervals.
4. To demonstrate the concept of vector differentiation and interpret the physical and geometrical meaning of gradient, divergence &curl in various engineering streams.
5. To know and apply the principles of vector integration to transform line integral to surface integral, surface to volume integral &vice versa using Green's, Stoke's and Gauss divergence theorems.

Course Outcome:

CO1: Discuss the need and use of complex variables to find roots, separate complex quantities, and to establish relation between circular and hyperbolic functions.

CO2: Solve first and higher order differential equations and apply them as mathematical modeling in electric and mechanical systems.

CO3: Determine Fourier series representation of periodic functions over different intervals.

CO4: Demonstrate the concept of vector differentiation and interpret the physical and geometrical meaning of gradient, divergence &curl in various engineering streams.

CO5: Apply the principles of vector integration to transform line integral to surface integral, surface to volume integral &vice versa using Green's, Stoke's and Gauss divergence theorems.

Course Content:

Unit 1: Complex Number [07 Hours]

Definition and geometrical representation, De-Moivre's theorem (without proof), Roots of complex numbers by using De-Moivre's theorem, Circular functions of complex variable – definition, hyperbolic functions(only concept).Logarithm of Complex quantities.

Unit 2: Ordinary Differential Equations of First Order and First Degree and Their Applications [07 Hours]

Linear equations; Reducible to linear equations (Bernoulli's equation).Exact differential equations; Equations reducible to exact equations . Applications to RL/RC circuits and mechanical systems.

Unit 3: Linear Differential Equations with Constant Coefficients [08 Hours]

Introduction, Complementary function, particular integral. Rules for finding complementary functions and particular integrals; Method of variation of parameters.

Unit 4: FOURIER SERIES [7 HOURS]

Introduction, Euler's formulae. Conditions for Fourier series expansion - Dirichlet's conditions; Functions having points of discontinuity. Change of interval. Odd and even functions - expansions of odd and even periodic functions. Half-range series.

Unit 5: VECTOR DIFFERENTIAL CALCULUS [7 HOURS]

General rules of vector Differentiation; Scalar and vector fields: Gradient, divergence and curl; Solenoidal and irrotational vector fields; Vector identities, Green's lemma, Gauss' divergence theorem and Stokes' theorem (without proofs)

Tutorial on MATLAB or Scilab [15 HOURS]

For Tutorial Purpose, Practice examples on Unit 1 to Unit 5 on MATLAB or Scilab.

1. Mathematical Function,
2. Basic Plotting

Text Books

1) Higher Engineering Mathematics by B. S. Grewal, Khanna Publishers, New Delhi.
2) Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons, New York.
3) A Course in Engineering Mathematics (Vol II) by Dr. B. B. Singh, Synergy Knowledge ware, Mumbai.
4) A Text Book of Applied Mathematics (Vol I & II) by P. N. Wartikar and J. N. Wartikar, Pune Vidyarthi Griha Prakashan, Pune.
5) Higher Engineering Mathematics by H. K. Dasand, Er. Rajnish Verma, S. Chand & CO. Pvt. Ltd., New Delhi.

Reference Books

1) Higher Engineering Mathematics by B. V. Ramana, Tata McGraw-Hill Publications, New Delhi.
2) A Text Book of Engineering Mathematics by Peter O'Neil, Thomson Asia Pvt. Ltd., Singapore.
3) Advanced Engineering Mathematics by C. R. Wylie & L. C. Barrett, Tata Mcgraw-Hill Publishing Company Ltd., New Delhi.

First Year (Semester - II)

Object Oriented Programming using Java

Course Code	Teaching Scheme	Examination Scheme	Credit	Course Category
ESC202	Lecture: 3 hrs./week	Continuous Assessment: 20 Marks Mid Semester Exam:20 Marks End Semester Exam: 60 Marks (Duration 03 hrs.)	3	ESC

Course Objectives:

1. To introduce students to the fundamental concepts, history, and features of Java programming.
2. To enable students to understand and apply object-oriented programming principles in solving real-life problems.
3. To develop knowledge of inheritance, polymorphism, abstraction, and interfaces for modular program design.
4. To familiarise students with exception handling and package concepts for building reliable and reusable applications.

Course Outcomes:

1. Explain the core concepts of Java such as JDK, JVM, data types, operators, and program structure.
2. Apply control statements, arrays, and strings to solve simple computational problems.
3. Demonstrate the use of object-oriented programming features like classes, objects, constructors, and encapsulation.
4. Analyse and apply inheritance, polymorphism, abstraction, and interfaces in program design.
5. Evaluate and implement error handling and package concepts to create reliable and reusable applications.

Unit 1: Introduction to Java **[8 Hours]**

Java: Introduction, History, Need and Features; Concept of JDK, JRE and JVM; Structure of Java Program; Console Input and Output; Formatting Output; Data types, Variables, Constants, Scope of Variables, Operators and keywords; Type Conversion and Casting

Unit 2: Control Statements and Array **[8 Hours]**

Selection Statements: if, if-else, nested if-else, if-else if, switch case; Iterative Statements: while, for and do-while; Jump Statements: continue, break and return; Array; For-each loop; String

Unit 3: OOP **[6 Hours]**

Introduction to OOP; Need of OOP; Object and Class; Method, Constructor, static keyword and this keyword; Data Encapsulation: Concept and Advantages; Getter and Setter methods

Unit 4: Inheritance and Polymorphism **[10 Hours]**

Inheritance: Concept Types, and Advantages; Java Access Modifiers - Private, Default, Public and Protected; super Keyword; Polymorphism: Concept and Advantages; Operator Overloading; Method Overloading and Method Overriding; Static and Dynamic Polymorphism

Unit 5: Data Abstraction and Exceptions Handling **[12 Hours]**

Data Abstraction; Abstract Class and Abstract Methods; final Keyword; Interface; Difference between Abstract Class and Interface; Package: Concept, Types - Built-in and User-defined and Advantages. Exceptions; Types of Exceptions - Built-in and User-defined; Difference between Checked and Unchecked Exceptions; Try, Catch, Finally, throw, and throws; Flow control in Try catch block; Throw vs Throws; Final vs Finally vs Finaliz..

Reference Books:

1) Joel Murach and Michael Urban, Murach’s Beginning Java with Eclipse, Murach & Publication, 1st Edition, 2016.
2) Doug Lowe, Java All-in-One for Dummies, Wiley Publication, 4th Edition, 2014.
3) Herbert Schildt, Java the Complete Reference, McGraw-Hill Publication, 9thEdition.
4) Patrick Niemeyer, Daniel Leuck, Learning Java, O'Reilly Media, 4th E dition,2013.
5) JavaScript: The Good Parts‖, Douglas Crockford, O‘Reilly, ISBN: 9782744055973.
6) Kathy Sierra, Bert Bates and Trisha Gee, "Head First Java", O'Reilly.
7) Bruce Eckel, "Thinking in Java", Prentice Hall.
8) K. Somasundaram, "Introduction to Java Programming", Jaico Publishing House.
9) Richard Wiener and Lewis J. Pinson, "Fundamentals of OOP and Data Structures in Java", Cambridge University Press.

First Year (Semester – II)

Object Oriented Programming using Java Lab

Course Code	Teaching Scheme	Examination Scheme	Credit	Course Category
ESC202L	Practical-2 hrs. week	Continuous Assessment: 60 Marks End Semester Exam: 40 Marks	1	ESC

Course Objectives :

1. To provide hands-on practice in writing, compiling and executing Java programs using different IDEs.
2. To enable students to implement object-oriented programming concepts in practical problem-solving.
3. To strengthen programming skills through the implementation of inheritance, polymorphism and abstraction.
4. To develop the ability to handle exceptions and use packages for modular and error-free coding.

Course Outcomes:

After successful completion of this course, students will be able to:

1. Write Java programs to demonstrate basic data types, operators and input-output operations.
2. Implement selection, looping and array-based problems using Java control structures.
3. Construct programs using object-oriented features such as classes, objects, methods and constructors.
4. Design and implement inheritance, polymorphism, abstraction and interfaces in Java programs.
5. Apply exception handling and package concepts to develop robust, modular and reusable applications.

Practical No.	Title	Hours
1	Write a Java program to demonstrate use of different data types such as int, float, char, boolean, string and array. Perform at least two operations on each data type.	2
2	Write a Java program to accept name, age and percentage from user using Scanner class and display them in formatted output.	2
3	Write a Java program to define a class Student with attributes rollNo, name and marks. Create objects of the class, initialize them and display their details.	2
4	Write a Java program to demonstrate use of constructor overloading in a class Employee.	2
5	Write a Java program to demonstrate use of static variables and static methods in a class.	2
6	Write a Java program to demonstrate use of this keyword to resolve ambiguity between instance variables and method parameters.	2
7	Write a Java program to demonstrate single inheritance with classes Person and Student.	2
8	Write a Java program to demonstrate multilevel inheritance with classes Person → Student → Result.	2
9	Write a Java program to demonstrate method overriding and use of super keyword in inheritance.	2
10	Write a Java program to demonstrate method overloading and method overriding in polymorphism.	2
11	Write a Java program to demonstrate data abstraction using abstract class Shape with abstract method area(). Implement subclasses Circle and Rectangle to calculate area.	2
12	Write a Java program to demonstrate interface with Vehicle interface containing method speedUp(). Implement the interface in Car and Bike classes.	2
13	Write a Java program to demonstrate multiple inheritance in Java using interfaces.	2
14	Write a Java program to create a user-defined package for arithmetic operations. Import and use the package in another program.	2
15	Write a Java program to demonstrate exception handling using try, catch, finally, throw and throws. Handle ArithmeticException and ArrayIndexOutOfBoundsException.	2

First Year (Semester-II)

Engineering Physics

Course Code	Teaching Scheme	Examination Scheme	Credit	Course Category
BSC203	Lecture: 2 hrs./week	Continuous Assessment: 20 Marks Mid Semester Exam: 20 Marks End Semester Exam: 60 Marks (Duration 03 hrs.)	2	BSC

Course Objective:

1) To provide a firm grounding in the basic physics principles and concept to resolve many Engineering and technological problems.
2) To understand and study the Physics principles behind the developments of engineering materials.

Course Outcomes:

CO1. Explain the production of polarized light and analyze the principles, construction, and applications of lasers (Ruby and He–Ne) used in engineering and technology.

CO2. Understand and differentiate various types of oscillatory motions, explain the production and applications of ultrasonic waves, and analyze dielectric properties and polarization mechanisms in materials.

CO3. Apply the concepts of quantum mechanics such as matter waves and wave equations, understand the basic principles of quantum computing, and explain nuclear physics concepts including nuclear reactions and radiation detection.

CO4. Analyze crystal structures using unit cell parameters and Miller indices, and apply the principles of electron optics to study the motion of charged particles and determine the e/m ratio of an electron

CO5. Compare different magnetic materials, explain the electrical properties of semiconductors, analyze Hall effect and superconductivity, and describe their practical applications in modern technology.

Course Contents:

Unit 1- Engineering Optics **[6 Hours]**

Interference of light in thin film, wedge shaped film, Newton's rings, polarization of light, methods for production of polarized light (Reflection, Refraction& Double refraction, Principle and structure of optical fiber, acceptance angle, acceptance cone, numerical aperture. Principle of laser, Einstein's coefficients, Types of laser – Ruby and He-Ne laser and their application.

Unit 2 – Oscillation, Ultrasonic and Dielectrics **[6 Hours]**

Free oscillation, damped oscillation, Forced oscillation and Resonance, differential wave equation, Ultrasonic waves, production of ultra-sonics (Piezoelectric effect, Magnetostrictions effect) and its applications. Dielectric parameters (Dielectric constant,

Electric displacement, Polarization & Polarizability) Types of polarization, temperature and frequency dependences of dielectric materials.

Unit 3- Quantum Mechanics and Nuclear Physics [6 Hours]

De-broglie Hypothesis of Matter waves, Introduction and properties of matter waves, Wave function and physical significance of matter waves, Heisenberg's uncertainty principle, Schrodinger's time dependent and time independent wave equations, Introduction to Quantum computing (Difference between classical & quantum computing, bits, qubits), Introduction to mass defect, Q value of nuclear reaction, properties of alpha, beta, gamma rays, GM counter.

Unit 4 – Crystal Structure and electron optics [6 Hours]

Unit cell, Bravais lattice, cubic system, number of atoms per unit cell, coordination number, atomic radius, packing density, relation between lattice constant and density, lattice planes and Miller indices. Motion of charged particles in electric and magnetic field, measurement of e/m by Thomson method.

Unit 5 – Magnetic Materials, Semiconductor & Superconductor [6 Hours]

Magnetic materials (comparative study), BH curve, Types of Semiconductor, Band Theory of solids, Conductivity in Semiconductor, Hall Effect, Numerical. Superconductivity, properties of superconductor, Meissner effect, Types of superconductors, Application.

Reference Books

1) Engineering Physics- Hitendra K Malik, A. K. Singh-2010
2) Quantum Physics- Eyvind H. Wichman Vol.4-2008
3) Atomic and Nuclear Physics- N.Subrahmanyam, Brijlal, S. chand
4) Physics for Engineers -M. R. Srinivasen-2009
5) Engineering Physics- G. S. Raghavanshi-2010

Text Books

1) Engineering Physics-Dr. Amit T. Mane ,Dr.Vikas Patil(Nirali Prakashan)-2024
2) Engineering Physics- Dr. I. A. Shaikh, Suhas Pandit Shukla-2023
3) Fundamentals of Physics- Halliday and Resnik, Willey Eastern limited

First Year (Semester-II)

Engineering Physics Lab

Course Code	Teaching Scheme	Examination Scheme	Credit	Course Category
BSC203L	Practical- 2 hrs./week	Continuous Assessment: 60 Marks End Semester Exam: 40 Marks	1	BSC

Course Outcomes:

CO1: Demonstrate understanding of physical principles by performing experiments in optics, electronics, modern physics, and materials science.

CO2: Apply experimental techniques to measure physical quantities like wavelength, resistivity, band gap, specific rotation, and Hall coefficient with precision.

CO3: Use modern laboratory equipment such as lasers, optical fibers, GM counters, and semiconductor measurement systems safely and effectively.

LIST OF PRACTICALS

Minimum 10 practical's are to be performed based on contents from syllabus Sample List of Practical's:

Practical No.	Title
1	NEWTONS RINGS – Determination of Radius of Curvature of Plano Convex Lens/Wavelength of Light.
2	Wedge Shaped Film – Determination of Thickness of Thin Wire.
3	Half Shade Polarimeter – Determination of Specific Rotation of Optically Active Material.
4	Laser – Determination of Wavelength of He-Ne Laser.
5	Crystal Plane- Study of Planes with the Help of Models Related Miller
6	G. M. Counter - Determination of Operating Voltage of G. M. Tube
7	P-N Junction Diode VI Characteristics
8	Hall Effect – Determination of Hall Coefficient
9	Four Probe Method – Determination of Resistivity of Semiconductor.
10	Measurement Of Band Gap Energy of Semiconductor.
11	Demonstration of optical fiber and Determination of its numerical aperture.
12	Ultrasonic Interferometer Experiment.

FIRST YEAR (SEMESTER- II)

Introduction to AI and Generative AI

Course Code	Teaching Scheme	Examination Scheme	Credit	Course Category
AMPCC204	Introduction to AI and Generative AI	Term work: 50 Marks	1	PCC

Course Objectives:

1. Understand the basic ideas of AI and related terms.
2. Understand in simple terms how Generative AI and AI Chatbots work.
3. Learn to write clear and effective prompts for different tasks.
4. Explore the use of AI tools for text, language, images, audio, presentations, coding and learning.
5. Understand the limits, risks and responsible use of AI.

Course Outcomes: After completion of the course, the students will be able to:

CO	Course Outcomes
CO1	Explain the basic concepts of AI and the relationship between AI, ML, Deep Learning, Generative AI and LLM.
CO2	Describe in simple terms how Generative AI and AI chatbots work.
CO3	Apply prompt engineering techniques to write and improve prompts.
CO4	Apply AI tools for text, language, image, audio, presentation, coding and learning tasks.
CO5	Discuss the limits, risks and responsible use of AI, including bias, privacy, copyright and academic integrity.

Unit I: Introduction to Artificial Intelligence (03 Hrs.)

What is AI and everyday examples of AI; Brief history and growth of AI; Traditional software vs AI; Human Intelligence vs Artificial Intelligence: Similarities and differences; Overview of types of AI (ANI, AGI and ASI); Relationship between AI, Machine Learning, Deep Learning, Generative AI and LLM.

Unit II: Introduction to Generative AI (03 Hrs.)

What is Generative AI; How Generative AI works: basic ideas such as training data, tokens and predicting the next word; Overview of popular AI tools (for example ChatGPT, Google Gemini, Microsoft Copilot, Claude and Perplexity); Capabilities and limitations of Generative AI.

Unit III: Prompt Engineering **(03 Hrs.)**

What is a prompt; What is prompt engineering and why it matters; Types of prompts: Zero-shot, Few-shot, Chain-of-thought and Iterative; Parts of a good prompt: role, task, context, format and limits; Framework for writing prompts; Weak prompt vs strong prompt, with examples; Improving a prompt step by step; Ready-made prompt templates.

Unit IV: Applications of AI Tools **(03 Hrs.)**

AI for text generation and summarization; AI for translation and language assistance; AI for image generation and editing; AI for audio and video generation; AI for presentations and document creation; AI for coding assistance; AI for study and learning.

Unit V: Responsible AI **(03 Hrs.)**

Limitations of Generative AI: hallucinations, inaccurate information and unreliable outputs; Bias and fairness: sources of bias in AI output and its impact; Privacy and data security: personal data, confidential data and safe use of AI tools.

Textbooks

1. Saptarsi Goswami, Amit Kumar Das and Amlan Chakrabarti: AI for Everyone: A Beginner's Handbook for Artificial Intelligence, 1st Edition, Pearson India, 2024.
2. Niraj Kumar Tiwari and Praveen Kumar Tripathi: Introduction to AI & Prompt Engineering, 1st Edition, S.K. Kataria and Sons, 2026.
3. Kapila Arora and Geetu Garg: Prompt Engineering for Beginners, 1st Edition, Arcchie Publications, 2024.
4. DAIR.AI: Prompt Engineering Guide. Free open-source web guide. https://www.promptingguide.ai

Reference Books

1. T. V. Geetha: Generative AI, Pearson India, 2025.
2. Eric C. Richardson: Prompt Engineering, BPB Publications, 1st Edition, 2025.
3. Shivani Goel: Express Learning – Artificial Intelligence, 1st Edition, Pearson Education, 2013.
4. UNESCO: Recommendation on the Ethics of Artificial Intelligence, 2021. Free to read online. https://www.unesco.org/en/artificial-intelligence/recommendation-ethics

MOOC Links

1. NPTEL Course: Introduction to Artificial Intelligence – IIT Delhi
   https://nptel.ac.in/courses/106102220
2. NPTEL Course: Introduction to Large Language Models (LLMs) – IIT Delhi and IIT Bombay
   https://nptel.ac.in/courses/106102576
3. NPTEL Course: Responsible & Safe AI Systems – IIIT Hyderabad and IIT Madras
   https://nptel.ac.in/courses/106106472

FIRST YEAR (SEMESTER – II)

AI Tools and Applications Lab

Course Code	Teaching Scheme	Examination Scheme	Credit	Course Category
AMVSEC204L	AI Tools and Applications Lab	Continuous Assessment: 60 Marks End Semester Exam: 40 Marks	2	VSEC

Course Objectives:

1. Understand how AI Chatbots work in practice and explore their interfaces and capabilities.
2. Develop skills to write, test and improve prompts for different tasks.
3. Use AI tools for text, language, image, audio and presentation tasks.
4. Apply AI tools for data analysis and programming help using sample data.
5. Create a simple AI-powered application and use AI tools safely and honestly.

Course Outcomes: After completion of the practical's, the students will be able to:

CO	Course Outcomes
CO1	Explain the interfaces and basic capabilities of AI chatbots and compare their responses.
CO2	Apply prompt engineering to write, test and improve prompts for different tasks.
CO3	Apply AI tools for summaries, study material, reports, translation and language improvement, and check the output for errors.
CO4	Use AI tools to generate and edit images, audio and presentations.
CO5	Apply AI tools for data analysis and programming help, and create a simple AI-powered application.

List of Practical's (Any 12 practiclas from following)

1. Create accounts on AI chatbots. Explore their interfaces and understand their basic capabilities.
2. Ask different types of questions (factual, explanation and creative) to 3 hatbots. Compare the answers on accuracy, clarity and depth. Write a short conclusion on which chatbot suits which task.
3. Use an AI chatbot for question answering, explanations and learning assistance.
4. Write, test and improve prompts for different tasks (prompt engineering).
5. Generate summaries, study material, notes, reports and structured content using Generative AI.

6. Use AI tools for translation, grammar correction and language improvement.
7. Generate images using text-to-image AI tools. Edit and enhance images using AI tools.
8. Explore AI audio generation, speech-to-text and text-to-speech.
9. Generate PowerPoint presentations using AI tools.
10. Explore AI tools for data analysis using sample datasets.
11. Use AI tools for programming assistance, code explanation and debugging.
12. Create a simple AI-powered application using a no-code or low-code platform.
13. Use AI tools to generate Excel formulas, create charts, organize datasets, automate document preparation, and interpret tabular information.
14. Use AI tools to create quizzes, MCQs and question banks on selected topics.
15. Use AI tools to create flowcharts, diagrams and concept maps from given text.
16. Use AI tools to prepare resumes, cover letters and professional emails.

Textbooks

1. Saptarsi Goswami, Amit Kumar Das and Amlan Chakrabarti: AI for Everyone: A Beginner's Handbook for Artificial Intelligence, 1st Edition, Pearson India, 2024.
2. Niraj Kumar Tiwari and Praveen Kumar Tripathi: Introduction to AI & Prompt Engineering, 1st Edition, S.K. Kataria and Sons, 2026.
3. Kapila Arora and Geetu Garg: Prompt Engineering for Beginners, 1st Edition, Arcchie Publications, 2024.
4. DAIR.AI: Prompt Engineering Guide. Free open-source web guide. https://www.promptingguide.ai

Reference Books

1. T. V. Geetha: Generative AI, Pearson India, 2025.
2. Eric C. Richardson: Prompt Engineering, BPB Publications, 1st Edition, 2025.
3. Shivani Goel: Express Learning – Artificial Intelligence, 1st Edition, Pearson Education, 2013.
4. UNESCO: Recommendation on the Ethics of Artificial Intelligence, 2021. Free to read online. https://www.unesco.org/en/artificial-intelligence/recommendation-ethics

MOOC Links

1. NPTEL Course: Introduction to Artificial Intelligence – IIT Delhi
   https://nptel.ac.in/courses/106102220
2. NPTEL Course: Introduction to Large Language Models (LLMs) – IIT Delhi and IIT Bombay
   https://nptel.ac.in/courses/106102576
3. NPTEL Course: Responsible & Safe AI Systems – IIIT Hyderabad and IIT Madras
   https://nptel.ac.in/courses/106106472

First Year (Semester - II)

Engineering Graphics

Course Code	Teaching Scheme	Examination Scheme	Credit	Course Category
ESC205	Lecture: 1 hrs./week	Continuous Assessment: 50 Marks	1	ESC

Course Objectives:

1. To prepare you to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
2. To prepare you to communicate effectively.
3. To prepare you to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Course Outcome:

CO1. Understand the basics of engineering graphics and its applications.

CO2. Describe the common terms used in design and drawing.

CO3. Construct the positions of line for given conditions.

CO4. Visualize the 2D and 3D views of the object.

CO5. Ability to apply orthographic, sectional, auxiliary and isometric view in engineering drawing.

CO6. Understand the geometries of development of engineering projects.

Course Contents:

Unit 1: Introduction to Engineering Graphics **[3 Hours]**

Principles of Engineering Graphics and their significance, usage of Drawing Instruments and Supporting Material, Letters and Numbers as per BIS: SP46-2003, Scale (Plane, Diagonal & Vernier scale) dimensioning techniques, geometrical construction.

Unit 2: Projections of Points, Lines and Planes **[3 Hours]**

Projections of points, point is situated in different quadrants, types of projection methods, Projections of straight lines, Principle of Orthographic Projections, Projection of Line, Lines inclined to both the Planes, projections of planes, types of planes, Projection of different simple shapes e.g. Circle, Triangle, Rectangle, Pentagon and Hexagon on principle plane (Inclined to one plane)

Unit 3: Projection of Solids **[3 Hours]**

Projection of solids, types of solids, Projection of Prism, Pyramid, Cone, Cylinder and Cube with their axis inclined to one reference plane and parallel to other.

Unit 4: Orthographic Projections **[3 Hours]**

Orthographic projections of different machine parts problem on first angle, Types of sections and Conversion of pictorial view into sectional orthographic views.

Unit 5: Isometric Projections **[3 Hours]**

Introduction, Isometric axes, lines, angles and planes, true scale and isometric scale. Isometric projection and Isometric view Conversion of given orthographic view into isometric projection.

Reference/Text Books:

1. N. D. Bhatt, Engineering Drawing, Charotar Publishing House, 46th Edition, 2003.
2. K. V. Nataraajan, A text book of Engineering Graphic, Dhanalakshmi Publishers, Chennai, 2006.
3. K. Venugopal and V. Prabhu Raja, Engineering Graphics, New Age International (P) Ltd, 2008.
4. Dhananjay A. Jolhe, Engineering Drawing with an Introduction to AutoCAD, Mc-GrawHill Education, 2017.

First Year (Semester - II)

Engineering Graphics Lab

Course Code	Teaching Scheme	Examination Scheme	Credit	Course Category
ESC205L	Practical-2 hrs./week	Continuous Assessment: 60 Marks End Semester Exam: 40 Marks	1	ESC

Course Outcome:

CO1. Able to interpret and create engineering drawings.

CO2. Application of geometric construction techniques.

CO3. Understanding projection method.

List of Practical's

Minimum 8 practical's are to be performed based on contents from syllabus Sample List of practical's:

Practical No.	Title
1	Lines, lettering and dimensioning.
2	Geometrical Constructions
3	Projections of points and straight lines
4	Projections of planes.
5	Projections of solids Prism, Pyramid
6	Projection of Solids Cone and Cylinder
7	Orthographic projections.
8	Isometric Projections.
9	Orthographic projections of different machine parts problem on first angle
10	Isometric view Conversion of given orthographic view

First Year (Semester - I)

Personality Development and Communication Skills

Course Code	Teaching Scheme	Examination Scheme	Credit	Course Category
AEC105	Lecture: 2 hrs./week	Continuous Assessment: 20 Marks Mid Semester Exam:20 Marks End Semester Exam: 60 Marks (Duration 03 hrs.)	2	AEC

Course Objectives:

1. To know and apply speaking and writing skills in professional as well as social situations

2. To Overcome Mother Tongue Influence and demonstrate neutral accent while exercising English

3. To know and apply communication skills for Presentations, Group Discussion and interpersonal interactions.

4. To know and apply grammar correctly during Speaking and Writing situations especially in context with Presentations, Public Speaking, Report writing and Business Correspondence.

Course Outcome:

CO 1. Inculcating the soft skills in theoretical and practical ways and also to develop the effective communication skills among students.

CO 2. Developing the effective communication skills among students.

CO 3. Learning about the essential factors for personality development and bringing them into practice.

Course Content:

Unit 1: Communication and Communication Processes [6 Hour]

Introduction to Communication, Forms and functions of Communication, Barriers to Communication and overcoming them, Verbal and Non-verbal Communication Reading: Introduction to Reading, Barriers to Reading, Types of Reading: Skimming, Scanning, Fast Reading, Strategies for Reading, Comprehension. Listening: Importance of Listening, Types of Listening and Barriers to Listening.

Unit 2: Verbal & Non-Verbal Communication [6 Hour]

Use of Language in Spoken Communication, Principles and Practice of Group Discussion, Public Speaking (Addressing Small Groups and Making Presentation), Interview Techniques, Appropriate Use of Non-verbal Communication, Presentation Skills, Extempore, Elocution.

Unit 3: **Study of Sounds in English** **[3 Hour]**

Introduction to phonetics, Study of Speech Organs, Study of Phonemic Script, Articulation of Different Sounds in English

Unit 4: **English Grammar** **[5 Hour]**

Grammar: Forms of Tenses, Articles, Prepositions, Use of Auxiliaries and Modal Auxiliaries, Synonyms and Antonyms, Common Errors.

Unit 5: **Writing Skills, Reading Skills & Listening Skills** **[5 Hour]**

Features of Good Language, Difference between Technical Style and Literary Style, Writing Emails, Formal and Informal English, Technical Reports: Report Writing: Format, Structure and Types Letter Writing: Types, Parts, Layouts, Letters and Applications, Use of Different Expressions and Style, Writing Job Application Letter and Resume

Unit 6: **Personality Development** **[5 Hour]**

Module 1: Personality- The Introduction, Personality meaning, determinants- physical, intellectual, emotional, cultural, Traits of personality, importance of personality development.

Module 2: Personality Development, Grooming, dress code, do's and don'ts, Social etiquettes, self-confidence.

Module 3: Self Analysis, SWOT analysis, Creative thinking, Goal setting, time management

Reference Books

1) Meenakshi Raman & Sangeeta Sharma, Technical Communication: Principles and Practice, Oxford University Press, 2019.
2) Bovee, Thill & Schatzman, Business Communication Today, Pearson Education, 2016.
3) Raymond V. Lesikar, Marie E. Flatley, Kathryn Rentz, Basic Business Communication: Skills for Empowering the Internet Generation, McGraw Hill, 2017.
4) John Seely, Oxford Guide to Effective Writing and Speaking, Oxford University Press, 2013.
5) T. Balasubramanian, A Textbook of English Phonetics for Indian Students, Macmillan Publishers, 2012.
6) Wren & Martin, High School English Grammar and Composition, S. Chand Publishing, 2017.
7) Shiv Khera, You Can Win: A Step-by-Step Tool for Top Achievers, Bloomsbury India, 2018.
8) Stephen R. Covey, The 7 Habits of Highly Effective People, Simon & Schuster, 2020.
9) Barun K. Mitra, Personality Development and Soft Skills, Oxford University Press, 2016.

First Year (Semester - II)

Personality Development and Communication Skill Lab

Course Code	Teaching Scheme	Examination Scheme	Credit	Course Category
AEC206L	Practical-2 hrs. /week	Continuous Assessment: 60 Marks End Semester Exam: 40 Marks	1	AEC

Course Outcome:

CO1. Inculcating the soft skills in theoretical and practical ways and also to develop the effective communication skills among students.

CO2. Developing the effective communication skills among students.

CO3. Learning about the essential factors for personality development and bringing them into practice.

LIST OF PRACTICAL

Minimum 10 practical's are to be performed based on contents from syllabus Sample List of Practical's:

Practical No.	Title
1	How to introduce oneself?
2	Introduction to Phonemic symbols.
3	Articulation of sounds in English with proper manner
4	Practice and exercises on articulation of sounds
5	Read Pronunciations/transcriptions from the dictionary
6	Practice and exercises on pronunciations of words
7	Introduction to stress and intonation
8	Rapid reading sessions
9	Know your friend
10	How to introduce yourself
11	Extempore
12	Group discussion
13	Participating in a debate
14	Presentation techniques
15	Interview techniques

First Year (Semester - II)

Workshops Practices

Course Code	Teaching Scheme	Examination Scheme	Credit	Course Category
VSEC207	Practical : 2 hr./week	Continuous Assessment: 50 Marks	1	VSEC

Course Objectives:

1) To impart knowledge and skills to use tools, machines, equipment and measuring instruments
2) To develop general machining skills
3) To educate about safe handling of machines and tools
4) To develop a skill in dignity of labour, precision, safety at workplace, team working and development of right attitude.

Course Outcome:

CO1. Prepare simple wooden joints and parts using wood working tools and machines

CO2. Apply the fitting and plumbing skills and produce a job with specified dimensions

CO3. Practice sheet metal tools and machine to develop the sheet metal articles

CO4. Practice edge preparation for simple Lap Built T Joint using Arc/GAS/Resistance welding equipment

CO5. Demonstrate machining process including turning, facing, step turning, drilling and parting

Course Contents:

A) Carpentry: Technical Terms related to wood working, Types of wood, Joining materials, Types of joints - Mortise and Tendon, Dovetail, Half Lap, etc., Methods of preparation and applications, Wood working lathe, safety precautions.

B) Welding: Arc welding - welding joints, edge preparation, welding tools and equipment, Gas welding - types of flames, tools and equipment, Resistance welding - Spot welding, joint preparation, tools and equipment, safety precautions.

C) Fitting and Plumbing: Fitting operation like chipping, filing, right angle, marking, drilling, tapping etc., Fitting hand tools like vices, cold chisel, etc. Drilling machine and its operation, Different types of pipes, joints, taps, fixtures and accessories used in plumbing, safety precautions.

D) Sheet Metal Work: Simple development and cutting, bending, Beading, Flanging, Lancing and shearing of sheet metal, Sheet metal machines - Bending Machine, Guillotine shear, Sheet metal joints, Fluxes and their use.

E) Machine shop: Lathe machine, types of lathes, major parts, cutting tool, turning operations, safety precautions

List of Practical:

Pr. No.	Title
1	Wood sizing exercises in planning, marking, sawing, chiseling and grooving to make half lap joint, cross lap joint, and mortise tenon joint and cylindrical wooden parts.
2	A job involving cutting, filing to saw cut, filing all sides and faces, corner rounding, drilling and tapping on M. S. plates.
3	A job on use of plumbing tools and preparation of plumbing line involving fixing of water tap and use of elbow, tee, union and coupling, etc.
4	Making a small parts using GI sheet involving development, marking, cutting, bending, brazing and soldering operations- i)Tray ii) Funnel and similar articles.
5	Exercise in Arc welding (MMAW) to make a square butt joint. Exercise in Resistance (Spot) welding to make a lap joint.
6	A job using power operated tools related to sheet metal work, Welding, Fitting, Plumbing, Carpentry and patternmaking.
7	A job on turning of a Mild Steel cylindrical job using center lathe

Reference/Text Books:

1) K. C. John, Mechanical Workshop Practice, Prentice Hall Publication, New Delhi, 2010.
2) Hazra and Chaudhary, Workshop Technology-I, Media promoters & Publisher private limited.

First Year (Semester - II)

Kautilya's Arthashastra

Course Code	Teaching Scheme	Examination Scheme	Credit	Course Category
IKS208	Tutorial: 2 hrs./week	Continuous Assessment: 50 Marks	2	IKS

Course Objectives:

1) To introduce students to the foundational principles of statecraft, economics, and governance as enunciated by Kautilya.
2) To highlight the relevance of Arthashastra in contemporary public policy, corporate governance, strategic thinking, and ethics.
3) To encourage critical thinking and appreciation of Indian knowledge systems in modern contexts.

Course Outcome:

1. Explain the life of Kautilya and the historical significance, structure, and classification of Arthashastra.
2. Analyze the Saptanga Theory and evaluate its relevance to modern statecraft and administration.
3. Interpret Arthashastra's economic and administrative policies including taxation, trade, governance, and intelligence systems.
4. Apply ethical values, leadership qualities, and strategic thinking (Mandala theory, Shama-Dama-Bheda-Danda) in decision-making.
5. Relate Arthashastra's principles to modern management, corporate governance, HRM, and public policy.
6. Examine real-world case studies to connect Arthashastra's teachings with contemporary governance and business practices.

Course Contents:

Module 1: Introduction to Kautilya and Arthashastra **[4 Hours]**

- Life and background of Chanakya (Kautilya/Vishnugupta)
- Historical context and significance of Arthashastra
- Structure and classification of Arthashastra (Books/Adhikaranas)

Module 2: Elements of State (Saptanga Theory) [4 Hours]

- The seven pillars of a kingdom: Swami (King), Amatya (Minister), Janapada (Population), Durga (Fort), Kosa (Treasury), Danda (Army), Mitra (Alliances)
- Relevance in modern state administration

Module 3: Economic and Administrative Policies [6 Hours]

- Revenue systems and taxation
- Trade, markets, and price control
- Governance and administrative structure
- Role of espionage and intelligence system

Module 4: Ethics, Leadership and Strategic Thinking [6 Hours]

- Raj Dharma and moral values
- Leadership qualities and decision-making
- Diplomacy and conflict resolution (Mandala theory)
- Use of Shama (conciliation), Dama (gifts), Bheda (division), Danda (punishment)

Module 5: Relevance in Modern Management and Governance [5 Hours]

- Application in corporate governance, HRM, strategic management
- Lessons for public policy, law, and administration
- Chanakya's management principles in startups and leadership

Module 6: Case Studies and Discussions [5 Hours]

- Case-based analysis of Arthashastra principles in real-world scenarios
- Group discussion, assignments, and presentations

Recommended Books and Resources:

Primary Texts

1) Kautilya'sArthashastra – Translated by R. Shamasastry (English Translation).
2) The Arthashastra – Translated by L.N. Rangarajan, Penguin Classics.

Supplementary Books

1) Corporate Chanakya – Dr. Radhakrishnan Pillai
2) Chanakya in Daily Life – Dr. Radhakrishnan Pillai
3) Chanakya's 7 Secrets of Leadership – D. Sivanandhan & Dr. Radhakrishnan Pillai

4) Kautilya's Arthashastra: *The Way of Financial Management and Economic Governance* – B. K. Chaturvedi

Online Resources

1) ePG Pathshala modules on Indian Political Thought
2) IGNOU Notes on Indian Political Thinkers
3) NPTEL Lecture Series (Humanities and Social Sciences)